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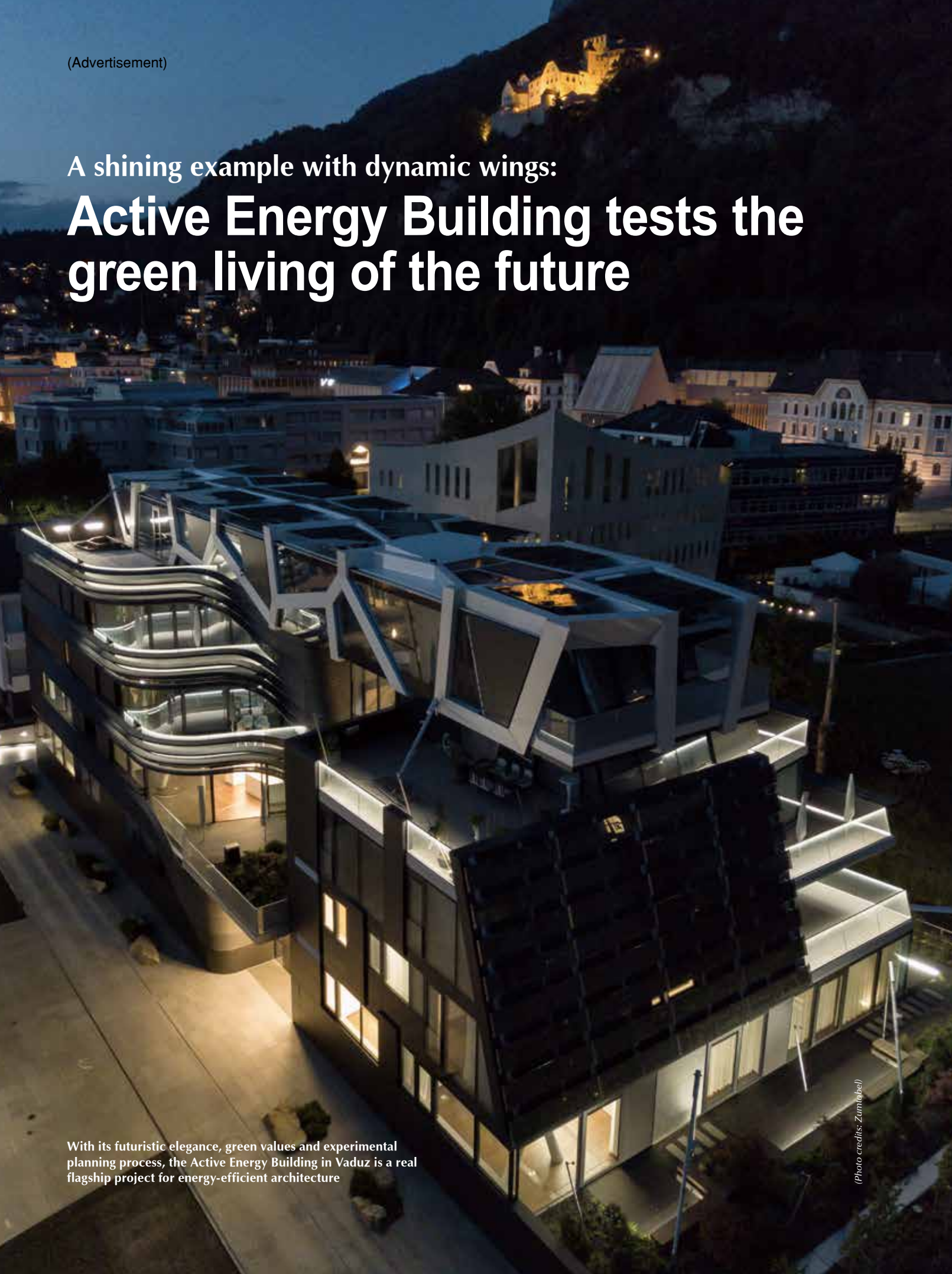
A shining example with dynamic wings:

Active Energy Building tests the green living of the future



With its futuristic elegance, green values and experimental planning process, the Active Energy Building in Vaduz is a real flagship project for energy-efficient architecture

(Photo credits: Zumtobel)

The complex of interlocking cubes blends organic lines with a distinct orthogonal geometry

Anchored in the gentle landscape of Liechtenstein like some kind of futuristic cruise ship is the Vaduz Active Energy Building. Interwoven spaces and dynamic lines blend to craft a solitary dark form in front of the lush green hills of the Alpine Rhine Valley. The future, which is immediately reflected in the ambitious geometry of the façade, has clearly defined the overall character of the Active Energy Building – a research project developed by falkeis2architects and shaped by experimental design principles, a self-sufficient approach to energy supply and an innovative Zumtobel lighting solution.

Alive. Always on the move. Forever active. Automatically controlled wing modules integrated into the façade reach up to the sky or nestle so tightly against the outer shell that they almost seem to merge with the building itself. These wings are a key part of the wider energy concept, helping to heat or cool the Vaduz Marxer Active Energy Building depending on the outside temperature. This sustainable experimental construction is the result of extensive research work. Behind the ambitious high-tech project is the owner Dr Peter Marxer, who awarded the planning assignment to the Viennese office of Anton Falkeis and Cornelia Falkeis-Senn following an international design competition. The common goal was to develop a visionary and energy-efficient residential complex – a complex that is not only self-sufficient, but one that also produces surplus energy for the national electricity grid.

The planning and realisation phase started back in 2011, when the architects took on the role of research pioneers. Their laboratory: the actual architecture. Design, planning, development and implementation ran parallel, as hundreds of finer details were tailored and tested on site. Each of the twelve modular units is unique in terms of size and layout – and can be repeatedly altered at any time. For the architects, designing a sustainable building was not just about innovative technologies, but also about adaptability. Areas can be merged or divided up without disturbing the supporting structures of the Active Energy Building, so that even a complete change of function poses no problem. To make this possible, the planners developed a minimalist load-bearing structure based on V-shaped composite columns made from steel and concrete. Interchangeable module variants were then inserted in an upward or downward

Continuous-row luminaires from the SLOTLIGHT range set accents in the living areas and enhance the special architectural features of the rooms

(Photo credits: Zumtobel)

The simple geometry of ONDARIA is pleasantly restrained. The integration of luminaires with different diameters adds a welcome creative element

direction, thrusting through the storeys like an organic branch structure. The supports of the load-bearing structure were precisely positioned using a genetic algorithm with predetermined criteria. In addition, all the walls and space-forming elements share a lightweight construction and can easily be removed.

Generous floor-to-ceiling window fronts bring the landscape into the interior, where the imagery of the outside world is embellished by a natural colour concept. Zumtobel lighting solutions perfectly accentuate the organic lines of the building and support the sustainable construction philosophy. SLOTLIGHT infinity continuous-row LED luminaires in the living areas trace the floor plan and set the scene for a cosy and modern living atmosphere. As uninterrupted light arteries with a homogenous light surface, these lines integrate themselves into the architecture – and thereby underline the special character of the project. A sophisticated lighting management system allows various different moods and central control, while in communal zones like the corridors and lounges, the simple geometry of ONDARIA delivers pleasantly soft light and helps boost general well-being. The sound-absorbing properties of this wide-area luminaire also make it an ideal option for busy spaces where any soothing effect is welcome. Completing the overall concept, round PASO II recessed LED fittings have been installed flush in the floor to provide efficient and discreet general illumination.

Structural geometry modelled on nature

The upper floors of the building are framed by a steel structure that forges a kind of honeycomb net. The polygonal structure is based on the Voronoi algorithm that divides large surfaces into individual cells and geometrically determines the best ratio of load-bearing capacity to material thickness – and consequently enables consistent reduction of the supporting structure. The role model for all of this: nature itself, which has provided key templates like the shape of an insect's wings. Heating and cooling vanes are mounted on the façade and the roof has been optimised to absorb photovoltaic elements. When the sun shines, the vanes lift away from the surface and orientate themselves in line with the rays of light. This kind of technology has helped increase the

Zumtobel solutions emphasise the angles of the different spaces and illuminate areas with diffuse, indirect light

Round PASO II LED fittings have been recessed into the floor to provide efficient general lighting

active energy yield by 2.9 times compared to a fixed installation. The resulting surplus is then shared out in the cluster or fed into the general electricity grid. Alongside the benefit of self-sufficient supply, the cooperative concept also compensates for any energy that is absorbed. Usage patterns in the residential Active Energy Building naturally differ from an office complex, but the network of Energy Clusters means that consumption requirements can be accurately reflected without marked fluctuations.

With its futuristic elegance, green values and experimental planning process, the Active Energy Building in Vaduz is a flagship project for energy-efficient architecture. And it has already grabbed the headlines in the media and caught the eye of the international architecture scene, as well as featuring in exhibitions in New York, Los Angeles, Vienna and Berlin. Yet the completion of the project has not signalled the end of the research work. The building will be carefully monitored for two years from the initial occupation to optimise both the usage and production of energy. The Active Energy Building really pushes the boundaries of technology – and has the potential to make a lasting impact as a true pioneer in the world of architecture.

For more information on Zumtobel lighting solutions, please contact:

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